AMRAD NEWSLETTER

Amateur Radio Research and Development Corporation May 1981

OUR MAY 4 MEETING will be an open forum on packet radio led by Dave Borden, K8MMO. First, Dave will kick off the meeting with a very brief tutorial. The rest of the meeting will be available for questions and answers on this subject. A number of AMRAD members in the Washington, DC area have VADCG terminal node controller boards and are about ready for on-the-air testing. We would like to see others join us locally on 147.81/.21 using 1200 baud Bell 202 modems. We are also working toward establishing an HF packet radio link with W1AW, Newington, CT. Please come prepared with some questions. As usual, the meeting will be at 7:30 p.m. at the Patrick Henry Branch Library, 101 Maple Ave E, Vienna, VA.

AMRAD's Meetings are devoted entirely to technical talks or other programs. No business is discussed except at the annual meeting in December. We do that to avoid the trap that some other clubs fall into, that of spending the entire evening debating a petty cash item. We don't just limit business; we just don't have any. The board of directors and officers take care of the business.

THE APRIL 6 TECHNICAL SYMPOSIUM went well. One of the IEEE Vehicular Technology Conference organizers told us that our symposium had the best attendance. We would like to thank the following people for their help in making this a successful event:

Moderator	:	Dr. Stephen J. Lukasik
Introduction:		Stuart Meyer, W2GHK
Speakers	:	David Borden, K8MMO George Collins, ADØW Hal Feinstein, WB3KDU Nathan O. Sokal, WA1HQC Robert E. Watson
Coordination:		Paul L. Rinaldo, W4RI Terry Fox, WB4JFI Gerald Adkins, N4GA Elton Sanders, WB5MMB

EXTRA COPIES OF THIS NEWSLETTER are being made available at the Dayton Hamvention and the Trenton Computer Festival. If you're an experimenter, AMRAD is the club for you to join. We now have about 400 members world wide who are interested in the technical side of amateur radio and computing. A number of AMRAD members were issued a Special Temporary Authority (STA) to experiment with spread spectrum communications. AMRAD is active in amateur computer networking under the acronym AMNET. We have a project to apply microcomputers to the telecommunications needs of the handicapped, in particular the interfacing of home computers to the standards used by teletypewriters for the deaf. We operate a two-meter voice/data repeater in the Washington, DC area and are setting up a 440-MHz repeater as well. A 220-MHz packet radio repeater is a likely possibility. We also publish a monthly AMRAD Newsletter which is mailed to all members and to other clubs on an exchange basis. We welcome your application for membership.

THE AMRAD NEWSLETTER IS LOOKING FOR ARTICLES for forthcoming editions. We pay authors at a rate of $10 per page (see back page of this newsletter for details). We are particularly interested in articles which combine amateur radio and computers.

PLAN TO ATTEND LPM'81, the ARRL Roanoke Division League Planning Meeting, May 9 1:00 p.m. thru dinner which begins at 7:00 p.m. and May 10 9:00 a.m. thru 1:00 p.m., at the Ramada Inn, Tysons Corner, VA. Topics include director's message, SCM reports, QSL bureau reports, ARES-traffic emergencies, technical session, SEC/FCC & Long Range Planning Committee reports and an open forum at the end. To preregister, send check to NOVARC, Box 682, McLean, VA 22101 (registration $3, banquet $10, Sunday continental breakfast $2). Or, pay slightly higher prices at the door. Everyone is welcome. Let your director and vice director hear your views.

THE DEAF AND THE TTY

Barry Strassler
Executive Director
Telecommunications for the Deaf, Inc.
814 Thayer Avenue
Silver Spring, Maryland 20910
301-589-3006

TDI FORMS SMARTTDD

In the past few months, the TDI has been deluged with requests for information both on computer TDD interfaces and on electronic mail systems. These come from computer-oriented deaf individuals and from hobbyists sensitive to the needs of the deaf in communications.

To cope with the demand, the TDI has formed a SMARTTDD section and plans to come out with a quarterly newsletter, commencing in May.

What is SMARTTDD? It is a combination of two terms, joined together. SMART means a "smart" computer terminal, and TDD means telecommunication device for the deaf. This term was coined by Paul Andereck, the project officer of the DEAFNET grant, as well as several AMRAD-related projects. Andereck, by the way, is the father of two deaf daughters and obviously has more than just a professional interest in the deaf.

At the suggestion of Andereck late in 1979, a SMARTTDD box was installed on DEAFNET. It has been used as a clearinghouse for information on home computers -- their uses, applications and programming tips.

The TDI feels, and Andereck agrees, that now is the time to get interested people involved, on a nationwide basis, with the concept that SMARTTDD has been trying to advocate.

If anyone of you are interested in receiving this newsletter or to help with the SMARTTDD movement, please drop us a line.

THE NATIONAL CRISIS CENTER FOR THE DEAF invited AMRAD members Elton and Nan Sanders to attend its opening ceremonies on February 9. Sandy and Nan provided the technical expertise needed to make their computer compatible with deaf TTY/TDD's, a result of AMRAD's development of a TDD interface for the Apple II computer.

The Center operates under a program of the University of Virginia Medical Center in Charlottesville, VA. Three doctors from the university are the medical directors. The people who answer TTY/TDD calls have medical training as well as special training in communicating with deaf people.

A Toll-free TTY Number, 1-800-446-9876 operates 24 hours a day. The center is ready to respond to emergencies such as: sudden illness or injury (ambulance/rescue quad), personal crisis (counselor/someone to talk to), poisoning, police, and fire.

RADIO AMATEURS WITH RTTY CAPABILITY often ask us what the deaf TTY/TDD standards are and how to use their teletypewriters to communicate with deaf friends/relatives over the phone lines. Here is a cram course. First, TTY's used by hams in the U.S. for amateur RTTY are compatible with those used by the deaf in the U.S. Normally, they are Teletype Corporation models 15, 19, 28 or 32, using U.S. communications (military) keyboard arrangement and 45.45 baud signaling speed. CCITT ITA-2 and some other keyboard arrangements can also be used because the deaf usually ignore the figures case characters. Then, you'll need a modem and a telephone coupler of some type. If you plan to homebrew the modem, set it to 1400 Hz mark and 1800 Hz space, half duplex; i.e., transmission and reception are on the same frequency pair. Then you'll need either an acoustical coupler or a direct coupler such as a data access arrangement (DAA). Or, you can buy combination modem/couplers ready to go. Two manufacturers are: Applied Communication Corp, PO Box 555, Belmont 94002 and Phone-TTY, Inc, 14-25 Plaza Rd, Fair Lawn, NJ 07410. Once in operation, you can call someone with a TTY/TDD. The protocol is that the answering party types first, something like "HI THIS IS PAUL." It's free form from there. Here are some commonly understood abbreviations: HD - hold the line; GA - Go Ahead (sent at the end of each transmission except the last one); and SK - end of conversation. Telephone numbers of TTY/TDD's are listed in the TDI telephone directory ($10 1st year; $5 renewal). You will want your number listed too.

PROTOCOL

David W. Borden, K8MMO
Rt 2, Box 233B
Sterling, VA 22170
703-450-5284 (Metro No.)

NEWS

Intel has just announced a new integrated circuit which could provide packet networks with an inexpensive Terminal Node Controller (TNC). The 8274 multiprotocol serial controller is billed as a replacement for the 8251 universal synchronous/asynchronous receiver-transmitter (USART) chip. The 8251 is a very popular chip, especially in the AMD version which implements a real control register. The 8273 protocol controller is the integrated circuit that AMRAD has been using in our (VADCG) TNC boards. It appears that the 8274 would take the place of both the 8273 and the 8250 serial controller on the TNC board. The 8274 has two full-duplex channels. Assuming that we can program one channel to be asynchronous and the other channel to be bit-synchronous HDLC (High-Level Data Link Control), as suggested by the new product information, a node controller should be inexpensive to construct. The price of the chip is $30.30 in quantities of 100 and should drop quickly as volume deliveries begin in June.

ARTICLES OF INTEREST

The following articles contain interesting material concerning packet communications:

(1) Walter A. Levy, "Packet-switching systems go private," Mini-Micro Systems, March 1981, pp. 87-96.

(2) Robert J. Halprin, "Hip Packet," QST, April 1981.

(3) Walter A. Levy and Michael Rothberg, "Coaxial cable finds a home," Mini-Micro Systems, March 1981, pp. 99-108.

(4) John Seaman, "Easy Efficient Ways to Link Offices," Computer Decisions, April 1981, pp. 103-182.

A PRIMER ON PACKET RADIO

In case you are new to the data communications scene, the following short primer on packet radio communications is presented. It is slanted toward what some of the Canadians and AMRAD are doing.

Packetizing data is the process of breaking up a logical block of data into smaller units called packets. That smaller unit can be sent from source to destination efficiently and error free. The microcomputer has really made this old idea more acceptable in modern data communications. These inexpensive computers are used at the station nodes of the network and at the end user, called the terminal node. All station nodes are treated as equals, and no central control node is required. The real benefit of packetizing data is the services that can be provided between source and destination. Code conversions can take place, analog-digital and digital-analog conversion can be accomplished, sophisticated routing algorithms may be employed, and, in general, transmission is very fast and error free. Of great interest to radio amateurs and the Federal Communications Commission is the time-division multiplex aspect of packet communications. Because each packet is short (the faster the baud rate, the shorter the packet), the packets of different users may be interleaved on the channel. Thus, many separate conversations may be going on at the same time on a given frequency. This is channel sharing as never before.

At the terminal node (end user of the system), a small microcomputer accepts data from some serial device such as a terminal running in asynchronous format. The data is packetized and entered into the network by turning on a transmitter and sending the packet in synchronous format to a station node. The terminal node controller actually first requests the terminal node to make a connection to the destination terminal prior to sending actual data. The station node assigns a temporary address to the source and destination terminal nodes and allows communication to begin.

What does a packet look like. First, those familiar with normal computer ASCII data expect start bits and stop bits. In synchronous communication, there are no start and stop bits because synchronization is achieved by the use of SYNC characters. An HDLC packet looks like this:

continued

SYNC/FLAG/ADDRESS/CONTROL/PACKET HEADER/ DATA/FCS/FLAG

SYNC - The first packet of a group of packets contains a sync which is 16 bits of alternating zeros and ones.

FLAG - 8 bits (01111110), 7E hex.

ADDRESS - 8 bits, FF hex for broadcast, assigned by station node at connect time.

CONTROL - 8 bits that describe the type of packet.

PACKET HEADER - 8 bits, 20 hex for terminal ops, 00 for network ops.

DATA - from zero (supervisory packet) to 255 bytes of information to be sent from source to destination.

FCS - Frame check sequence, 16 bits of cyclic redundancy check.

FLAG - 8 bits (01111110), 7E hex.

How do I generate a packet and receive one? A computer is required. There are two accepted methods. In the less expensive method, your already existing microcomputer and existing serial port are connected to a Bell 202 modem (a 1200-baud modem which uses 1200 Hz for mark and 2200 Hz for space) and your VHF radio. The packet is generated in *software* and *byte-oriented* protocol results (asynchronous start-stop packets). This type of operation is currently in use in parts of Canada, but in our opinion should be discouraged as the bit-oriented synchronous protocol is industry standard.

In a bit-oriented synchronous protocol (HDLC protocol packet was illustrated above), a small computer, called a Terminal Node Controller generates the packet using an integrated circuit called a protocol controller. You connect your computer terminal (or preferably your computer) to the TNC, and the output is connected to the Bell 202 modem and radio.

The packet travels across the country passing from station node to station node until it arrives at the destination station node and finally the destination terminal node. There are no station nodes in place yet. This is the real heart of the network, and these computers must be emplaced. If a station node is added, every station node in the network reconfigures its routing tables to include the newcomer. If a node dies, all other station nodes again reconfigure their tables to subtract the lost node from the network.

What do I have to buy to begin operation? Assuming you already have a personal microcomputer and serial port, you buy a Bell 202 modem and TNC printed-circuit board. All this hardware will become less lexpensive as work progresses. New integrated circuits are being introduced (such as the 8274) which should make circuits less complex. Inexpensive modems are becoming available. Contact AMRAD for advice on how to get started.

APPLICATIONS

Once this packet network is in place, what can we do with it? The obvious application for the radio amateur is the National Traffic System (NTS). Third party messages can be introduced into the packet network by NTS members and quickly passed to other members around the country. Emergency communications can be served by designing a survivable station node to activate in times of national disaster. Deaf TTY users can be accommodated. Slow-scan television users could send television pictures across the network. Computer file transfers, graphics, computer multiprocessing and teleconferencing are areas to be studied.

AMRAD proposes to call this continental network of packet radio nodes AMNET. Connections between the individual pockets of activity will at first take the form of HF radio links. Then VHF terrestrial and satellite links will complete the network.

Watch the AMRAD Newsletter for future developments concerning amateur packet radio computer networking.

.-.-.

FOR SALE: ASR 33 TTY, 20-mA current loop with stand. Well maintained. $300.00. Karen Miller, 703-860-1819.

FOR SALE: ICOM IC-2AT hand held with HM-9 speaker-mic, BP3 and BP4 battery packs. $250. Ten-Tec Century 21 10-80m transceiver with automatic keyer. Excellent condition. $225.00. Call 591-8420 home or 471-5600 X140 and ask for Tedd Riggs.

COMMERCE TOURS INTERNATIONAL, INC., 870 Market St Suite 742-744, San Francisco, CA 94102, 415-433-3072 announces the following international tours:

Tour A: Depart U.S. Oct 7; Japan Electronics Show, Osaka, Oct 8-12; Korea Electronics Show, Seoul, OCT 13-15; Taiwan Electronics Show, Taipei, Oct 16-18; Japan International Electric Measurement & Control Instrumentation/Automation Exhibition, Tokyo and Japan Data Show, Tokyo, Oct 19-21.

Tour B : Same as above except Hong Kong Electronics Show, Oct 19-21.

Price:	from West Coast	East Coast
Double Occupancy	$2290	$2655
Single Occupancy	$2730	$3095

Prices include airfare, hotel accommodations, breakfast, land transporation for group activities, dinners, cocktails and city tours.

FCC ENCOURAGES AMATEUR RADIO EXPERIMENTATIONS in news release 07818, March 9, 1981. For a copy of this release write FCC Private Radio Bureau, Education Branch, 1919 M St, NW, Washington, DC 20554 or telephone 202-632-7125 or 632-7126.

NOVATION, INC., 18664 Oxnard St., Tarzana, CA 91356, 213-996-5060, displayed some interesting new products at the Federal DP Expo, April 14-16.

Apple-Cat II* is a p-c board which plugs into the Apple computer. The basic unit, which sells for $389, includes 300-baud Bell 103 and 1200-baud Bell 202 modems, pulse & tone dialing, software and a phone line interface. There are options which include BSR*control, cassette recorder cable, DTMF receiver and firmware. However, the real breakthrough is the deaf firmware which, for $29 additional, permits the modem to communicate with 45-baud Baudot teletype-writers via a built-in Weitbrecht modem. AMRAD has placed an order for the Apple-Cat II with deaf firmware for development of a small community ASCII/Baudot message system.

*Apple is a trademark of Apple Computer Inc.
Cat is a trademark of Novation, Inc.
BSR is a trademark of BSR Corporation.

INFONE is a combination teletype and ASCII/Baudot terminal with 125-word memory and is capable of synthesizing speech with a vocabulary of 250 words. It has a full ASCII keyboard and a 40-character LCD display. It can be ordered with various modem combinations including CCITT, Bell 103/202, and Weitbrecht (deaf). Features also include auto-dial, auto-answer, a printer port, direct or acoustic modem, real time clock, and home security device connections. It is not much bigger than an ASCII keyboard and will fit into a slim attache case with room to spare. It can be ac or battery operated.

The Modem Modules will also be offered in single or dual configurations for around $100 and $150 respectively. The modules are approximately 2 inches square and about a half inch thick. Modems include Bell 103, 202 and Weitbrecht. Ask Novation for details. They are also offering a phone line interface module (performs DAA functions) for $100.

POS 103/202 MODEM is a new product line announced by Pacific Office Systems, 918 industrial Ave, Palo Alto, CA 94303, 415-493-7455. The standard model can be ordered with one or two (switch-selectable) modem card(s) (Bell 103, 202 or one of each). Up to six cards can be housed in the rack-mountable version. Ask POS for specs and prices.

CERMETEK, INC. 1308 Borregas Av, Sunnyvale, CA 94086, 408-734-8150, is offering a Bell 202T Evaluation Kit for $99 for a limited time. It is a half-duplex modem with 1800 bits per second on the forward channel and 150 on the reverse. For $99 you get the chip set, p-c board and connector. Data sheets and application notes are also available.

ANOTHER 202 MODEM, this one an assembled and tested unit, is available from Tony Rotondo, Intertel, Inc., Six Shattuck Rd, Andover, MA 01810, 617-681-0600. The CM2020 is a Bell 202S compatible modem card, 30 square inches, which is available in one or two units per order for $199 plus $2 shipping prepaid.

Ed. Note: I guess that should end the doubts about the availability of 202 modems. In addition, as reported in the February 1981 AMRAD Newsletter, Hank Magnuski, KA6M has a supply of Rixon/Sangamo T202D modems for $50 to $90. Hank can be reached on 415-854-1927. It looks like a 202 modem will be a good investment for both telephone line and 2-meter data communications.

AN ARES TRS-80 BASIC COMPUTER PROGRAM has been developed by Sam Gardner, WØOAG for use by EC's and DEC's. Information on the capabilities of each ARES member can be typed in and tabulated, minimizing the time it takes to make a monthly report to the SEC or compile the EC annual report. For a program print-out, send an SASE with 2 1st class stamps to ARRL, Newington, CT 06111. *de QCD.*

AMRAD **Amateur Radio Research and Development Corporation**

Membership Application/Renewal

Mail to: Gerald Adkins, Treasurer
1206 Livingston St N
Arlington, VA 22205

See reverse for overseas mailing rates.

Dues:	Annual	Life
Regular	$12	$120
2nd in family	6	60
Full-time student	3	-

Please make checks payable to AMRAD.

Name_____
Ham Call_____ Home Phone( )_____

Address_____
City,
State_____ ZIP_____

Class License_____ ☐ARRL Member
Have: ☐2-meter FM ☐RTTY
☐Computer model_____
Microprocessor type_____

I agree to support the purposes of the Corporation.

*Signature*_____

THE AMATEUR RADIO RESEARCH AND DEVELOPMENT CORPORATION is a technically oriented club of about 00 radio and computer amateurs. It is incorporated in the Commonwealth of Virginia and is recognized by the Internal Revenue Service as a tax-exempt scientific and educational organization.

THE PURPOSES OF THE CLUB are to: develop skills and knowledge in radio and electronic technology; advocate design of experimental equipment and techniques; promote basic and applied research; organize forums and technical symposiums; collect and disseminate technical information; and, provide experimental repeaters.

MEETINGS ARE ON 1st MONDAY of each month at 7:30 p.m. at the Patrick Henry Branch Library, 101 Maple Ave E, Vienna, VA. If the 1st Monday is a holiday, an alternate date will be announced in the *AMRAD Newsletter*. Except for the annual meeting in December, meetings are normally reserved for technical talks - not business.

THE WD4IWG/R REPEATER is an open repeater for data communications (including RTTY), voice and experimental modes. It is located at Tyson's Corner, McLean, VA and has excellent coverage. It features a semi-private autopatch available to licensed members. Frequencies are: 147.81 MHz input, 147.21 MHz output. The head of the technical committee is Jeff Brennan, WB4WLW, 7817 Bristow Dr, Annandale, VA 22003, phone 703-354-8541.

THE AMRAD NEWSLETTER is mailed monthly to all members and to other clubs on an exchange basis. Technical articles, new product announcements, news items, calls for papers and other copy related to amateur radio and computing are welcome. Honorariums at a rate of $10 per printed page ($20 maximum per author per issue) are paid for original material accepted. Classified ads are free to members. Commercial ad inquiries are invited. The editor reserves the right to reject or edit any portions of the copy. Items should be mailed by the 8th of the preceeding month to Paul L. Rinaldo, W4RI, Editor, 1524 Springvale Ave, McLean, VA 22101; phone 703-356-8918. Full permission for reprinting or quoting items appearing in the *AMRAD Newsletter* is granted provided that credit is given. Mailing is by 3rd Class bulk mail to U.S. addresses and 1st Class to Canada and Mexico. Overseas readers add 96¢ for surface or $7.80 for air mail to annual dues.

THE AMRAD MESSAGE SYSTEM is an S-100 Computerized Bulletin Board System on 703-734-1387, system operator Terry Fox, WB4JFI. Terry's home phone number is 703-356-8334. The system accepts 110, 300, 450 and 600 baud ASCII callers using Bell 103-compatible modems.

THE HANDICAPPED EDUCATION EXCHANGE (HEX) is operated by AMRAD for those involved in education and communications for the handicapped. It accepts both 110/300-baud ASCII and deaf TTY callers. on 301-593-7033. The sysop Dick Barth, W3HWN's home phone is 301-681-7372.

AMRAD OFFICERS for 1981 are:

Gerald Adkins, N4GA	Treasurer
Jeffrey Brennan, WB4WLW	Director
	Repeater Trustee
Tedd Riggs, KC4YN	Librarian
Robert E. Bruninga, WB4APR	Director
	VP-Asia
Kenneth Coghill, WB4ZOH	1st Alt.
Terry Fox, WB4JFI	Director
	Vice Pres.
	Computer Trustee
William Pala, Jr., WB4NFB	Director
	Secretary
Paul L. Rinaldo, W4RI	Director
	President
Elton A. Sanders, Jr., WB5MMB	2nd Alt.

THE AMRAD LIBRARY is operated by Tedd Riggs, KC4YN, 8402 Berea Ct, Vienna, VA 22180, phone 703-573-5067. Donations of technical books, magazines, manuals and catalogs are tax-deductible.

AMRAD IS AFFILIATED with the American Radio Relay League (ARRL), the Foundation for Amateur Radio, the Northern Virginia Radio Council (NOVARC) and The Mid Atlantic Repeater Council (T-MARC).

SPECIAL INTEREST GROUPS are formed from time to time. Currently we have SIG's on Deaf Communications and Spread Spectrum Communications. If you are interested in joining or forming a SIG, please contact Bill Pala, WB4NFB, 5829 Parakeet Dr, Burke, VA 22015; phone 703-323-8345.

TRAINING CLASSES are run as needed. Please discuss your training requirements with any Director.

AMATEUR RADIO RESEARCH AND
DEVELOPMENT CORPORATION
1524 SPRINGVALE AVENUE
MCLEAN, VA USA 22101

Nonprofit Organization
U.S. Postage
PAID
McLean, Virginia 22101
Permit No. 1511

HANK S MAGNUSKI KA6M
311 STANFORD AV
MENLO PARK CA 94025